Designed for high-performance, scalable and simple-to-use small to medium-size SAN environments

IBM TotalStorage SAN16M-2 Express Model

High density design with 16 ports in an efficient half-rack width and 1RU height helps save rack space

Highlights

- ***Simple-to-use SAN switch with ease-of-installation and ease-of-use features designed specifically for the needs of small to medium-size environments***
- ***Foundation for new infrastructure simplification and business continuity solutions for servers running Microsoft® Windows®, Linux® and NetWare® operating systems***
- ***High-performance 4 Gigabit per second links with pay-as-you-grow FlexPort scalability enables growth from 8 to 12 to 16 ports***
- ***Designed for high availability with hot swappable dual power supplies and HotCAT online code activation***

IBM TotalStorage SMB solutions

The IBM TotalStorage® SAN16M-2 Express Model is designed specifically to meet the needs of small to medium-size SAN environments. It can be used to create a wide range of high-performance SAN solutions, from simple single-switch configurations to larger multi-switch configurations which support fabric connectivity and advanced business continuity capabilities. Infrastructure simplification solutions for IBM @server® xSeries® servers include storage consolidation and high-availability server clustering with IBM TotalStorage disk storage arrays. Business continuity solutions include data protection with IBM TotalStorage tape libraries and devices and IBM Tivoli® Storage Manager data protection software.

A single SAN16M-2 Express Model can serve as the cornerstone of a Storage Area Network for those who want to obtain the benefits of storage consolidation and are just beginning to implement Fibre Channel storage systems.

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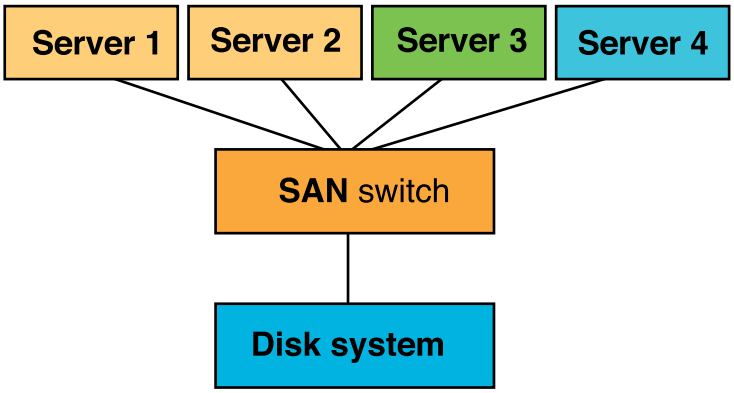
BUILT FOR MID-SIZED BUSINESS.

Such an entry-level configuration can consist of one or two Fibre Channel links to a disk storage array or to an LTO™ tape drive. An entry-level eight-port storage consolidation solution can support up to seven servers with a single path to either disk or tape. The FlexPort feature is designed to enable a base switch to grow to sixteen ports, in four port increments, to support more servers and more storage devices without taking the switch offline.

A high-availability solution can be created with redundant switches. This capability is ideal for server clustering environments. Such a configuration can support from six to fourteen servers, each with dual Fibre Channel adapters cross-connected to redundant SAN16M-2 Express Model switches which are cross-connected to a dual-controller storage system.

Simple SAN configuration

The introduction of large capacity, high-availability storage systems offers new opportunities for cost reduction through storage consolidation and infrastructure and management simplification. In older environments each server accessed its own dedicated storage capacity using either internal disks that were contained within the server or disks which were part of an external system attached exclusively to that server. It has become difficult to sustain that approach as the requirement for both storage capacity and numbers of servers has increased. Storage consolidation is a fundamental objective of infrastructure simplification and is based on the philosophy that it is easier to share and manage capacity contained in a large capacity, high-performance and high-availability external storage system such as provided by the IBM TotalStorage DS4000 family. Fibre Channel Storage Area Networks (SANs) were developed to provide efficient, high performance access from many servers to many storage devices.



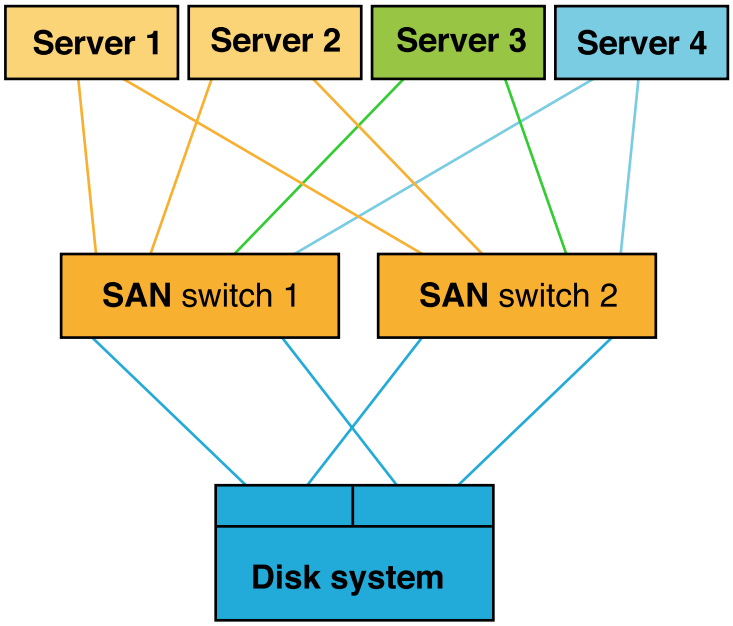
While it is possible, in very small environments, to direct-connect servers to external storage systems using fibre channel links, it is more common to configure a SAN switch between the servers and the storage system to enable multiple servers to share the same storage capacity. This simple SAN is depicted in the diagram above.

The SAN16M-2 Express Model was designed specifically for use as the SAN switch in this type of configuration. It is easy to install and easy to manage. The tan, green and blue servers represent heterogeneous server types which are members of the same SAN and share capacity of the large disk system. The SAN16M-2 Express Model can be upgraded to 16 ports and is future-ready to support 4 Gbps servers and storage devices as they are introduced. Its flexible design allows participation with other SAN m-type switches in fabrics that evolve as requirements change. And it supports advanced functions to enable participation in complex fabrics including cascaded switches and ISL trunks.

High availability SAN configuration

Many applications require continuous operation. A common design approach to achieve that objective is to run multiple instances of the application across

a cluster of servers. When a server fails or must be taken offline for maintenance a backup server is available to continue operation with a minimum of impact. Redundant paths to data are usually configured in a clustered server environment for the same reasons in an effort to provide continuous access to data. Each server is configured with redundant Host Bus Adapters. And each Host Bus Adapter is connected to a different SAN switch, and each switch is connected to a different controller in a disk system. Every effort is made to provide continuous application access to data.



The SAN16M-2 Express Model is an excellent switch to use in a clustered server environment. Separate SAN switches enable two separate SAN fabrics, which are desirable as a means to minimize or eliminate single points of failure. The tan cluster shown on this page provides redundant components at every level and is designed to minimize application outages.

Business continuity solution

Many small and medium size companies want to implement a business continuity or remote backup capability to meet strict new regulatory requirements. The SAN16M-2 Express Model can provide the SAN connectivity required for these environments. The diagram on the next page is intended to represent two different sites. The blue side represents the production site and the green side represents the remote or backup site.

Many disk subsystems, including IBM TotalStorage DS4000 systems, are capable of copying data to a remote location. The data path for the remote copy operation is represented by the red links in the diagram.

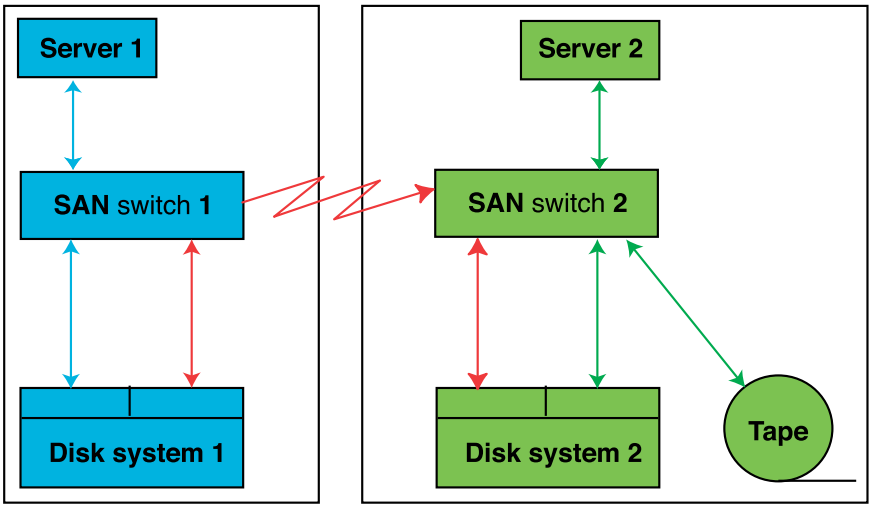
Two SAN16M-2 Express Model switches can be connected over metro distances (up to 10km) using longwave SFP optical transceivers. Longer distances can be supported with SAN routers which transmit Fibre Channel Protocol (FCP) over Internet Protocol (IP) networks.

Two SAN16M-2 Express Model switches can also be used to connect two locations to enable remote data backup. An Information Lifecycle Management (ILM) application such as IBM Tivoli Storage Manager (TSM) which runs on a server in the production site can write data to a tape system at a remote location. The same distance capabilities are available as for the business continuity solution described above.

First time SAN user characteristics

Easy to install and maintain

The SAN16M-2 Express Model includes capabilities designed to make it easy to install and easy to maintain for system administrators who have minimal experience with SAN components. EFCM Basic provides intuitive graphic switch management capabilities. Installation and backup/restore wizards are included for novice users which are designed to help guide them through switch setup and operation.



EFMC Basic (formerly SANpilot) is designed for first-time SAN users with minimum SAN expertise. EFCM Basic can help simplify monitoring and configuration management. Functions include Web browser access, fabric and switch configuration management, port activity monitoring and reset, firmware updating, event logging, diagnostics and online help. Whether you have a single switch or a small fabric to manage, EFCM Basic capabilities and functionality can help simplify management of your SAN solution.

Pay-as-you-grow scalability

The **FlexPort Expansion** feature is designed to support scalable switch upgrades. The FlexPort feature provides an activation key and four shortwave SFPs which upgrades the switch in four-port increments while helping avoid fabric disruption. The ability to increase switch capacity while maintaining service helps customers implement a pay-as-you-grow strategy while minimizing impact to applications.

High performance

The SAN16M-2 Express Model provides 4 Gbps performance on all ports. Each port auto-negotiates to 4, 2 Gbps or 1 Gbps, full duplex depending on the capabilities of the attached device or switch. Up to 128 Gbps aggregate throughput is possible with 16-port configurations.

Network performance can be enhanced with the **Open Trunking** feature which automatically balances performance throughout a network while minimizing storage administrators' involvement. Open Trunking is designed to optimize the total throughput between two switches automatically by redirecting traffic from high-utilization links to links with available bandwidth. Open Trunking is designed to continuously monitor loads on all links, detect congestion and automatically balance traffic across available ISLs without operator interaction. Based on constant traffic monitoring, Open Trunking acts to help improve throughput and reroute traffic efficiently.

High-availability

Small and medium size businesses require high-availability switch fabric solutions. The SAN16M-2 Express Model uses advanced application-specific integrated circuits (ASICs) to help minimize the number of internal components and thus improve reliability.

The SAN16M-2 Express Model is designed to provide hot-swappable, load-sharing dual power supplies designed to allow the switch to remain

online if one power supply fails. Dual power cords allow attachment to separate power sources to help improve availability. Hot-swappable power components help eliminate downtime for service when replacing a failed component and help reduce or eliminate the risk of erroneously cabling a replacement switch because of a simple component failure. Failed power supplies are designed to be replaced without special tools, and hot-pluggable optical transceivers can be replaced without taking the switch offline.

FlexPort technology is designed to support switch port upgrades without fabric disruption. In addition, HotCAT online code activation is designed to allow firmware to be downloaded and activated while the fabric switch remains operational. Redundant switches can be deployed for high-availability clustering applications.

Advanced solution management

Open System Management Server (OSMS), a standard feature, is an ANSI (American National Standards Institute)-based capability that supports SAN management software from vendors such as VERITAS™, Tivoli and BMC. OSMS is designed to extend the switch's capability to include in-band management with an open systems host-based application. OSMS allows the fabric switch and devices attached to it to be "discovered," or seen in a fabric through a framework software application.

SANtegrity™ Enhanced (Security Suite) feature is designed to help enhance business continuity by reducing the impact of human influences on networked data. The feature includes SANtegrity Binding and SANtegrity Authentication.

SANtegrity Zoning, a standard capability of Enterprise Operating System (E/OS), provides hardware-enforced world wide name (WWN) and port zoning. SANtegrity Secure Management Zone (SMZ) is designed to secure management access to local and remote SAN devices over a secure connection.

SANtegrity Binding is designed to create multiple layers of access control, including port, switch and fabric binding.

Standards-based SANtegrity Authentication is designed to force each device in the SAN to prove who they are in order to avoid unauthorized access and unauthenticated devices.

Preferred Path, a standard feature, is designed to allow a customer to define routes across a fabric. The Preferred Path modifies the behavior of Open Trunking by providing guidance for the balancing function. The Preferred Path configuration helps address user preference regarding exit port assignment but is subject to the standard rules regarding the Fabric Shortest Path First (FSPF) protocol.

Full Volatility feature is designed to support high-security environments, which require no customer data be retained after power-off. Full Volatility is designed to configure a switch or director so that no frame data is stored after a power-off.

High port density, rack space savings

Rapidly growing Fibre Channel SAN infrastructures place a premium on rack space. The IBM TotalStorage SAN16M-2 Express Model uses SFP LC optical connectors and advanced packaging that requires only a half-rack width and one-rack–unit (1U) height for 16 ports redundant power supplies. **Shelf Mount Kit** feature enables installation of two SAN16M-2 Express Model switches and four power supplies for redundant 16-port switch solutions in 1RU. The SAN16M-2 Express Model is also tabletop stackable.

IBM TotalStorage SAN16M-2 Express Model at a glance

Product characteristics	
Product number	202616E
Base fabric switch	IBM TotalStorage SAN16M-2 Express Model with 16 ports: 8 ports activated, 8 shortwave 4 Gbps SFP transceivers, one power supply, EFCM Basic, Install and Backup/Restore Wizards, Open Systems Management Server and Preferred Path software.
Fibre Channel interfaces	E-Port, F_Port, FL-Port
Optical transceivers	4 Gbps shortwave SFPs
Fans and power supplies	Redundant (fixed) fans and dual replaceable (external) power supplies
Hot-swap components	SFP optical transceivers, power supplies
Rack support	19 inch, 1RU industry standard rack; Shelf Mount Kit feature for two switches, each with dual power supplies
Non-rack support	Desktop installation is supported; Country-specific power cords must be ordered
Management software	EFCM Basic, Install and Backup/Restore Wizards
Servers supported*	IBM @server xSeries and selected Netfinity® servers Other Intel® processor–based servers
Operating systems supported*	Microsoft® Windows NT®, Windows® 2000, Windows® 2003 Red Hat Linux™, Red Hat Linux Advanced Server SUSE™ LINUX, SUSE LINUX Enterprise Server (SLES) United LINUX Novell® NetWare
Storage products supported*	IBM TotalStorage DS4000 storage servers IBM TotalStorage 3580, 3588, 3590 and 3592 tape drives IBM TotalStorage 3581 Tape Autoloader IBM TotalStorage 3582, 3583 and 3584 tape libraries and 3584 High Availability Frame Model HA1, 3588 tape drive Other selected storage systems
Fibre Channel switches supported	IBM TotalStorage SAN m-type switches, routers and directors Other switches and directors manufactured by McDATA
Fibre optic cable	Fibre optic cables are required and are available in various lengths in single mode and multi-mode formats
Warranty (standard)	1-year; Customer Replaceable Unit (CRU) Service; IBM On-site Repair; warranty service upgrades are available
Optional features	Shelf mount kit for two SAN16M-2 Express Model switches Second Power Supply 4-Port FlexPort Expansion Kit with four shortwave SFPs Longwave 4 SFP optical transceivers SAN16M-2 Element Manager SAN16M-2 SANtegrity Enhanced SAN16M-2 Open Trunking SAN16M-2 Full Volatility Country specific power cords and PDU jumper cords

IBM TotalStorage SAN16M-2 Express Model at a glance

Physical characteristics	
Height (rack mount)	4.1 cm / 1.6 in (1RU)
Width	19.9 cm / 7.8 in (two fit side-by-side on shelf mount kit)
Depth	33.3 cm / 13.13 in plus 6.1 cm (2.4 in) for external power supplies
Weight	4.0 kg / 8.8 lbs
Operating environment	
Temperature	4° C to 40° C/40° F to 104° F
Relative humidity	8% to 80%
Electrical requirement	
Power	90-264 VAC, 47-63 Hz

* Refer to **ibm.com**/storage/san/m_type for the most current and complete details.

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